

REMARKS

[0001] Claims 1-30 are pending. The Office Action mailed 3/27/2006 (hereinafter "Office Action") rejected claims 1, 5, 8, 10, 11, 16, 17, 23-25, 29, and 30 under 35 U.S.C. § 102(b) as being anticipated under Ikeda, et al., U.S. Pat. 6,382,771 ("Ikeda"). The Office Action rejected claims 2, 3, 4, and 16 under 35 U.S.C. § 103(a) as being unpatentable over Ikeda in view of Shibata, et al., U.S. Pat. 6,296,347 ("Shibata"). The Office Action rejected claims 6, 7, 21, and 22 under 35 U.S.C. § 103(a) as being unpatentable over Ikeda in view of Kelly, U.S. Pat. 4,364,054 ("Kelly"). The Office Action rejected claim 9 under 35 U.S.C. § 103(a) as being unpatentable over Ikeda in view of Abe, U.S. Pat. 6,406,133 ("Abe"). The Office Action rejected claims 12 and 26 under 35 U.S.C. § 103(a) as being unpatentable over Ikeda in view of Shima, et al., U.S. Pat. 5,801,730 ("Shima"). The Office Action rejected claims 13, 20, and 27 under 35 U.S.C. § 103(a) as being unpatentable over Ikeda in view of Sohn, U.S. Pat. 5,576,747 ("Sohn"). The Office Action rejected claims 14 and 28 under 35 U.S.C. § 103(a) as being unpatentable over Ikeda in view of Mutou, U.S. Pat. 5,227,814 ("Mutou"). The Office Action rejected claim 15 under 35 U.S.C. § 103(a) as being unpatentable over Ikeda in view of Sohn and Shibata. The Office Action rejected claims 18 and 19 under 35 U.S.C. § 103(a) as being unpatentable over Ikeda in view of Minemoto, et al., U.S. Pat. 6,224,193 ("Minemoto").

AMENDMENT TO THE SPECIFICATION

[0002] The specification was amended to correct typographical errors related to a first set of electrical leads 206 and second set of electrical leads 208. The amendment is fully supported by the specification and drawings.

REJECTION OF CLAIMS 1,5,8,10,11,16,17,23-25,29, & 30 UNDER 35 U.S.C. §102(b)

[0003] The Examiner rejected claims 1, 5, 8, 10, 11, 16, 17, 23-25, 29, and 30 under 35 U.S.C. §102(b) as being anticipated by Ikeda. The Applicant respectfully traverses this rejection. “Anticipation under 35 U.S.C. §102 requires the disclosure in a single piece of prior art of each and every limitation of a claimed invention. ...Whether such art is anticipating is a question of fact.” *Apple Computer, Inc. v. Articulate Systems, Inc.* 234 F.3d 14, 20, 57 USPQ2d 1057, 1061 (Fed. Cir. 2000). It is well settled that under 35 U.S.C. §102 “an invention is anticipated if . . . all the claim limitations [are] shown in a single art prior art reference. Every element of the claimed invention must be literally present, arranged as in the claim. The identical invention must be shown in as complete detail as is contained in the patent claim.” *Richardson v. Suzuki Motor Co., Ltd.*, 9 U.S.P.Q.2d 1913, 1920 (Fed. Cir. 1989). In determining whether a prior art reference anticipates a claim, it is necessary to (1) determine the scope of Applicant's broadest claim, (2) determine exactly what the single prior art reference discloses, and (3) compare each and every claim limitation against the prior art disclosure. *SSIH Equipment, S.A. v. U.S Int'l Trade Commission et al.*, 218 U.S.P.Q. 678, 688. Only if each limitation is literally disclosed by the prior art reference is the claim anticipated.

[0004] Initially, it may be useful to review the invention described in the application and the disclosures of the prior art. In general, the application describes a system, apparatus, and method for electrorheological printing. Application at Abstract. A drop generator 108 includes a pressurized ink chamber 112 that contains an electrorheological ink. *Id.* at ¶¶ 40, 44, 49, Figs. 1, 2, 3. Electrorheological ink differs from other ink in that it changes viscosity in response to an electrical field. *Id.* at ¶¶ 6, 7. The pressurized ink chamber 112 is in fluid communication with a nozzle 204, 301. *Id.* at ¶ 11, Figs. 1, 3.

[0005] A stimulator 114 generates a synchronization signal that increases the pressure in the pressurized ink chamber 112. *Id.* at ¶¶ 12, 54, Figs. 1, 4. As the synchronization signal is enabled, the stimulator 114 increases pressure above a threshold at which electrorheological ink may be discharged through the nozzle 204, 301. *Id.* at ¶¶ 52-55, Fig. 4. An electrode arrangement 304, 306, 308, 310 creates an electric field to control a flow of electrorheological ink at the nozzle. *Id.* at ¶¶ 14, 47-50, Figs. 3, 4. When enough voltage is applied, the flow through the nozzle 204, 301 is stopped. *Id.* at ¶ 50. When a print signal in the form of an electrical signal is applied to the electrode arrangement 304, 306, 308, 310, flow of electrorheological ink through the nozzle 204, 301 is controlled. *Id.* at ¶¶ 51-56, Fig. 4. When a print signal is enabled, the ink stops and when the print signal is disabled, the ink flow is controlled by the stimulator 114. *Id.*

[0006] In one embodiment, a viscosity control module 510 varies the voltage to the electrode arrangement 304, 306, 308, 310 to vary the viscosity of the ink, and thus vary the flow of the ink. *Id.* at ¶ 63. In another embodiment, a media compensation module 512 adjusts the

control signals to compensate for the speed of the printed media passing below the drop generator 108. *Id.* at ¶ 64. An electrode control module 508, in another embodiment, controls the nozzles 301 in a nozzle array 200. *Id.* at ¶ 62.

[0007] By contrast, Ikeda teaches an improvement to a prior art method of accelerating ink droplets by adjusting the angle of the nozzle with respect to the print media. Ikeda at Abstract. Ikeda creates an electric field between the nozzle and the print media to positively charge ink droplets and accelerate the droplets to the print media. *Id.* at col. 1, ll. 29-52, col. 2, ll. 59-62, Fig. 2. Ikeda improves on the prior art by simply tilting the nozzle to accommodate for print head speed and optimizing the angle of tilt. *See generally id.*

[0008] Ikeda does not use electrorheological ink or any special ink, but simply uses water ink. *Id.* at col. 6, l. 4 (“Water ink is used as the ink 9.”). Ikeda does not create an electric field to control a flow of electrorheological ink at the nozzle. *See generally id.* Ikeda just charges the ink particles pushed out of the nozzle using a piezoelectric device by creating a high voltage from the nozzle to the print media. *Id.* at col. 6, ll. 47-63. Ikeda does not control viscosity or flow rate of the ink using an electric field, but instead teaches away from varying the electrical field strength. *Id.* at col. 8, ll. 37-42 (“Although the deviation of the impact position can be reduced if the electrostatic field is made stronger, the limit of the electrostatic field is almost -4KV/mm, wherein the deviation of the impact position becomes ± 0.04 mm. This is not practical.”).

[0009] The Office Action states that claim 1 of the Application is rejected as being anticipated by Ikeda under 35 U.S.C. § 102(b). Office Action, p. 2. The Applicant respectfully submits that claim 1 is not anticipated by Ikeda because the reference does not teach every

limitation of claim 1. Specifically, Ikeda does not teach an **electrorheological ink**. Application at claim 1 (emphasis added). Instead Ikeda teaches only a water ink. Ikeda at col. 6, l. 4. Ikeda also does not teach an electrode arrangement that creates an electric field to **control the flow** of the **electrorheological ink at the nozzle**. Application at claim 1 (emphasis added). Instead Ikeda teaches pushing out an ink droplet using a piezoelectric device and then accelerating the droplet to the print media by positively charging the droplet in an electrical field between the nozzle and the print media. Ikeda at col. 6, ll. 47-63.

[0010] The differences between claim 1 and Ikeda are significant and crucial. Ikeda and claim 1 are directed to completely different uses of an electrical field applied in completely different ways using different types of ink. The invention of claim 1 uses electrorheological ink and will not work with the water ink of Ikeda. Ikeda does not teach or suggest any other ink than water ink. The Applicant respectfully asserts that because Ikeda does not teach all of the elements of claim 1, claim 1 is in condition for allowance. The arguments above apply equally to independent claims 16, 17, 29, and 30 and the Applicant asserts that claims 16, 17, 29, and 30 are also in condition for allowance. In addition, claims 5, 8, 10, 11, and 23-25 depend from the independent claims listed above and the Applicant asserts that claims 5, 8, 10, 11, and 23-25 are in condition for allowance.

[0011] With regard to claim 10, the Office action states that Ikeda discloses “a print module configured to receive a print signal” and cites Ikeda, column 3, lines 15-20. Office Action at p. 3. The cited text does not teach anything close to a print module configured to receive a print signal. The cited text reads as follows:

“Still another aspect of the present invention is an ink jet recording apparatus, wherein said ink jet head includes: a pressure chamber containing said ink therein; the nozzle communicating with said pressure chamber and ejecting the ink; and pressure applying means for applying a pressure to said pressure chamber.”
Ikeda at col. 3, ll. 15-20.

The Applicant respectfully asserts that, in addition to the arguments in relation to claim 1, Ikeda does not teach all of the claim limitations of claim 10 and asserts that claim 10 is in condition for allowance. The arguments for claim 10 apply equally for claim 25 and the Applicant asserts that claim 25 is in condition for allowance.

[0012] Regarding claim 11, the Office Action states that Ikeda teaches the electrode control module further configured to “de-energize the electrode arrangement about when the synchronization signal and print signal are enabled” and cited Ikeda, column 3, lines 22-33. Office Action at p. 3. The Applicant disagrees. The Office Action equates applying an electrical field from the nozzle to the print media with the electrical field controlling electrorheological ink at the nozzle. *Id.* at p. 2 (text cited from Ikeda relating to the electrode arrangement). (As stated above, this assumption is incorrect.) Under this assumption, the cited text has nothing to do with de-energizing the electrode when the synchronization signal and print signals are applied.

[0013] The cited text is about applying a signal to the piezoelectric device. *See* Ikeda at col. 3, ll. 22-33. When this signal is applied to the piezoelectric device, the vibrations created by the piezoelectric device starts to eject ink droplets from the nozzle. *Id.* While this is occurring, the electrical field from the nozzle to the print media is active and the ink droplets are accelerated to the print media. *Id.* at col. 6, ll. 47-64. This is the opposite of what is claimed in claim 11. Claim 11 **de-energizes** the electrode arrangement when the synchronizing signal and print

signals are applied. The Applicant asserts that in addition to the arguments of claim 1 above, that Ikeda does not teach the limitations of claim 11 and asserts that claim 11 is in condition for allowance. The arguments for claim 11 apply equally to claim 24 and the Applicant asserts claim 24 is also in condition for allowance.

[0014] Regarding claim 23, the Office Action claims that Ikeda teaches “discharging a drop of the electrorheological ink from the nozzle” and cites Ikeda, column 3, lines 1-10, and column 6, lines 57-64. The Applicant disagrees. The cited text does not teach electrorheological ink, but instead only mentions that ink droplets are positively charged. As stated above, electrorheological ink changes viscosity in the presence of an electrical field. Application at ¶¶ 6, 7. Ikeda teaches simply using water-based ink. Ikeda at col. 6, l. 4. The Applicant asserts Ikeda does not teach the claim limitations of claim 23 and asserts that claim 23 is in condition for allowance.

REJECTION OF CLAIMS 2-4, 6, 7, 9, 12-15, 18-22, 26, 27, & 28 UNDER 35 U.S.C. §103(a)

[0015] The Office Action rejects claims 2-4, 6, 7, 9, 12-15, 18-22, 26, 27, and 28 under 35 U.S.C. § 103(a) as being unpatentable over Ikeda in view of several references. The Applicant traverses this rejection. The Examiner bears the initial burden of establishing a *prima facie* case of obviousness. MPEP at § 2142. The prior art reference (or references when combined) must teach or suggest all the claim limitations. MPEP at § 2142. In addition, even if all the claim limitations are taught or suggested by the prior art references, there must be some suggestion or motivation to combine reference teachings to establish obviousness. MPEP §2142.

[0016] Obviousness may be rebutted by showing that “the art, in any material respect, teaches away from the claimed invention.” MPEP at § 2144.05.III. “A reference may be said to teach away when a person of ordinary skill, upon reading the reference, would be discouraged from following the path set out in the reference, or would be led in a direction divergent from the path that was taken by the applicant. The degree of teaching away will of course depend on the particular facts; in general, a reference will teach away if it suggests that the line of development flowing from the reference’s disclosure is unlikely to be productive of the result sought by the applicant.” *United States v. Adams*, 383 U.S. 39, 52, 148 USPQ 479, 484 (1966). The Applicant respectfully asserts that Ikeda combined with Shibata, Kelly, Abe, Shima, Sohn, Mutou, and Minemoto fail to teach or disclose each element of the claimed invention as required under 35 U.S.C. § 103(a). The Applicant asserts that there is no motivation, suggestion, or teaching in any of the references to combine the references. The Applicant also asserts that Ikeda teaches away from the Applicant’s claimed invention.

[0017] The Office Action rejects claims 2, 3, 4, and 16 under 35 U.S.C. § 103(a) as being unpatentable over Ikeda in view of Shibata. The Applicant disagrees and traverses this rejection. Shibata is directed to electrostatic recording for transferring toner particles. Shibata at Abstract. While Shibata includes ring-like electrodes, *see* Shibata, Figs 5-8, they are not attached to a nozzle or anything that could be considered a nozzle. The electrodes of Shibata are connected to a roller 30 with a plurality of apertures 56 for toner particles. *Id.* at col. 5, ll. 3-9, Figs. 5-8.

[0018] In reference to claim 16, the Office Action states that Shibata teaches a “nozzle array defining a plurality of nozzles, each nozzle defining a nozzle volume configured to contain

an ink particle” and cites Shibata at column 6, lines 20-25. Office Action at p. 5. The cited apertures are not nozzles for ink, but instead are openings in a roller 30 for dry toner particles. Shibata at col. 5, ll. 3-9, col. 6, 20-25. Nozzles for ink are not the same as holes in a tube to allow dry particles to escape.

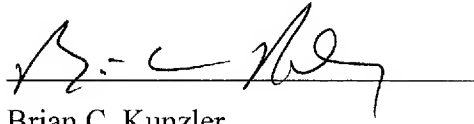
[0019] As stated above, Ikeda does not teach all of the claim limitations of claim 1, and in fact, teaches away from electrorheological ink. The combination of Ikeda and Shibata does not teach all of the limitations of claims 2, 3, 4, and 16. In addition, there is no suggestion or motivation in Ikeda to include ring-like electrodes. Shibata is directed to electrostatic recording using dry toner particles, and as such, contains no suggestion or motivation of a pressurized chamber in fluid communication with a nozzle with electrorheological ink, a stimulator to increase the pressure of the ink, and an electrode arrangement that creates an electric field to control flow of the electrorheological ink in the nozzle. The Applicant asserts that claims 2, 3, 4, and 16 are in condition for allowance.

[0020] The Office Action rejects claims 6 and 7 under 35 U.S.C. § 103(a) as being unpatentable over Ikeda in view of Kelly. The Applicant disagrees and traverses this rejection. With respect to claim 6, the Office Action states that Kelly teaches an “electrode arrangement [] configured to create an electric field to stop the flow of the electrorheological ink in the nozzle” and cites Kelly, column 4, lines 6-20. Office Action at p. 8. With respect to claim 7, the Office Action states that Kelly teaches an “electrode arrangement [] configured to create an electric field to slow the flow of the electrorheological ink in the nozzle” and cites Kelly, column 4, lines 6-20. The Applicant disagrees. The cited text reveals that Kelly relies on surface tension of the ink to

keep it from flowing and charging particles in the ink to overcome the surface tension. Kelly at col. 4, ll. 6-20. Kelly does not teach electrorheological ink where an electrical field changes the viscosity of the ink. Neither Ikeda nor Kelly teach an electrorheological ink and using electrodes to control the flow of ink in the nozzle. The combination of Ikeda and Kelly do not teach all of the limitations of claims 6 and 7 and the Applicant assert that the claims are in condition for allowance.

[0021] Claims 2-4, 6, 7, 9, and 12-14 depend from claim 1 and claims 18-22, 26, 27, & 28 depend on claim 17. The Applicant asserts that Ikeda does not teach all of the limitations of claims 1 and 17. The Office Action has not made out any obviousness case in relation to claims 1 and 17 individually and relies on the other references to show the limitations of the dependent claims. Any combination of Ikeda and the other cited references does not teach all of the claim limitations of claims 2-4, 6, 7, 9, 12-14, 18-22, 26, and 28 and the Applicant asserts the claims are similarly in condition for allowance because they depend from allowable claims. See, *In re Fine*, 837 F.2d 1071, 5 USPQ2d 1596 (Fed. Cir. 1988). Should additional information be required, the Examiner is respectfully asked to notify The Applicant of such need. If any impediments to the prompt allowance of the claims can be resolved by a telephone conversation, the Examiner is respectfully requested to contact the undersigned.

Respectfully submitted,

A handwritten signature in black ink, appearing to read "B. C. Kunzler", is written over a horizontal line.

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